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The purpose of the study was to test the hypothesis that students who watch their fingers in the beginning weeks of typewriting instruction will develop better techniques as shown on tests of speed and accuracy at the end of the school year than student who watch only their copy in accordance with the conventional teaching method. The major experimental and control groups consisted of 56 sophomore students matched individually by age, sex, grade average, and intelligence quotient. After the second quarter, the remaining students who could not be individually matched were used as additional experimental and control groups of 51 students each. Although the experiment failed to confirm the hypothesis in terms of gross speed there were differences significant at the 1 percent level in terms of net speed on the basis of errors in the timed writing in favor of both experimental groups. A strong relationship was found between the control variables and gross speed but not between the control variables and errors or net words. The results of this research indicate that the sight method merits trial by teachers. (JK)

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THE SIGHT METHOD OF TEACHING TYPEWRITING TECHNIQUE AND KEYBOARD

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Fairfax County Public Schools
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Fairfax, Virginia

August 1969

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
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The research reported herein was performed pursuant to a grant with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U.S. DEPARTMENT OF
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THE SIGHT METHOD OF TEACHING TYPEWRITING TECHNIQUE AND KEYBOARD

SUMMARY

Purpose: The primary objective of this research was to test this hypothesis: That students who watch their fingers in the beginning weeks of typewriting instruction will develop better technique as shown on tests of speed and accuracy at the end of the school year than students who watch only their copy and refrain from looking at their fingers according to the conventional teaching methods.

A secondary objective was to determine if sex, reading ability, intelligence quotient, piano, and grade average contribute or relate to the number of gross words, errors, and net words that pupils are able to type after one year of instruction.

Problem Justification: The research hereby proposed would have the beginning typist watch his fingers until the keyboard has been learned and the correct techniques have been developed. Emphasis is placed on how the fingers move rather than on the material typed. The time required for this learning period will, of course, vary with the individual but should be, on the average, of about the first twelve to fifteen hours of instructional time.

In recent years, typewriting specialists have suggested that the sight method of teaching beginning typists has merit, for example, Dr. Leonard J. West of the City University of New York, wrote an article in the Business Education World, September, 1967, in which he says, "The kinesthietic findings should make it apparent that the conventional insistance on non-visual operation at the start of learning is seriously wrong and decided longer tolerance of sight typing is required than even the boldest of today's teachers imagine or permit. Surely a study that points to an about-face on the central feature of instruction should be considered useful."[1]

Further justification of the theoretic principles underlying this research is the fact that typewriting is classified as a psychomotor skill; therefore, typewriting teachers should benefit from the theories of muscular learning used by coaches and instructors in the other fields that involve muscular learning.

Specialists teaching in the field of physical education advocate the use of visual analysis to evaluate and improve performances. As in the fields of physical education so in the field of typewriting, muscular learning needs visual aid because the feel alone may be deceptive.

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[1]Leonard J. West, "Teachers' Perceptions of Research," Business Education World, (Sept. 1967), p. 34.

Educators have long recognized the fact that the employment of the maximum number of senses produces the most efficacious learning experiences. Therefore, the sense of sight as well as the sense of hearing needs to be used in the teaching of typewriting.

Neuro-muscular integration is important to a typist and can be improved only with correct typing. To unlearn an incorrect technique and relearn correct responses is difficult; therefore, when this becomes necessary, most students become discouraged to the "dropping out" point. The hours spent on technique, watching the fingers and developing correct feel, are not only essential for the muscular learning but are important in developing a good mental attitude toward typewriting.

Through employing to the fullest the sense of sight for the purpose of learning, criticizing and evaluation his own skills and technique, the student should develop a correct pattern that becomes inherent in his continued growth and performance.

Procedures Used In The Study: The major experimental sample consisted of two beginning typewriting classes composed of 56 sophomore students in each group. The students in the groups were matched individually according to four variables: age, sex, grade average and intelligence quotient.

After the second quarter, the remaining students who could not be individually matched were used to form a second experimental and control group of 51 students in an attempt to further validate the results from the first analysis.

The experimental groups (sight method) were taught at Hayfield High-Intermediate School and the control group was taught at Edison High School. Both schools are in Fairfax County, Virginia and serve the same general area.

Three well qualified teachers taught the control group and two teachers including the instigator of this research taught the experimental groups.

The control group teachers had always used the teaching procedure as recommended by the 20th Century Typewriting Manual Published by the South-Western Publishing Company and agreed to continue this procedure during the research school year.

For the first twelve hours the students taught by the sight method watched their fingers and used no copy primarily to see that the fingers moved correctly and secondarily to learn the key location.

After twelve hours of using the sight method of teaching, the experimental class started using the textbook and watching the copy. After thirty more hours, the experimental group was on the same lesson in the text as the control group. Subsequently both groups of classes were taught in the same way for the remainder of the school year with one exception. Namely, each nine weeks for one hour the experimental group had a typing technique review lesson.

Timed writing tests were used for comparing the two groups. Each student took two timed writings and the better of the two were checked for the research.

Three-minute timed writings on new material were given to both groups on November 7-8, 1968. Gross words, errors and net words per minute were recorded for both groups. New words were computed by taking three words from the gross words for each error.

A five-minute timed writing test was administered January 30-31, April 1-2, and May 26-27, 1969. Gross words, errors and net words per minute were recorded. Two words were subtracted from the gross words for each error made to obtain the net speed.

Students were asked whether or not they played the piano and this was recorded to see if this related learning affected the typing skill. Students were not matched according to this criterion.

Analysis and Interpretation of Study: The hypothesis stated that students using the sight method in the beginning weeks of typewriting instruction would have greater speed than students taught by the conventional method. This did not prove true of gross typewriting speed. However, when net speed is the consideration the experimental group attained significantly higher net scores.

Figure 1 gives the comparison of the two groups in net words typed at the end of the second and fourth quarters. This illustration clearly shows that the frequency distribution was not normal for the control group for either the second or the fourth quarters. The experimental group showed a bell shaped curve which became more pronounced in the last quarter of testing. This would seem to indicate that in the experimental group, good techniques developed through "finger watching" would permit continued speed development and that the control group taught by the conventional method, would have far greater difficulty increasing their speed beyond their earlier level.

Table 1 and Figure 3 show the comparison of means of students taught by the two methods. Those taught by the sight method appear to gain in the number of gross words typed at about the same rate as those students who were taught by the conventional methods. The students taught by the sight method tended to make fewer errors as they progressed through their academic year while students taught by the conventional method gained in the number of errors per minute. The result was that students taught by the sight method were able to type significantly more net words per minute. A further validation of this result is shown in Figure 4 and Table 2 where the results are shown of 51 additional students in each group studied from the two groups for the last two quarters of the school year. This statistic showed the same pattern of no great difference in the number of gross words typed but fewer errors and greater net speed for the experimental group. The level of confidence was beyond the .01 level.

The secondary objective of the research was to determine if sex, reading ability, intelligence quotient, piano, and grade average contributed or related to the number gross words, errors, and net words that pupils are able to type after one year of instruction.

As indicated in Table 3, the gross words which a student will be able to type may be predicted with 34 per cent accuracy (R^2=0.340) with the following predictor variables: piano, reading ability, sex, intelligence quotient, and grade average. These variables are listed in the order in which they tended to increase the predictability of the equation, that is, piano permitted the greatest predictability followed by reading ability combined with piano and followed by sex in combination with the other four.

Neither errors or net words per minute could be effectively predicted by the five predictor variables.

A strong relationship was found between the control variables and gross words, but not between the control variables and errors or net words.

Conclusions and Recommendations: The hypothesis stated that students using the sight method in the beginning weeks of typewriting instruction would have greater speed and accuracy at the end of the first school year than students who had been taught by the more conventional method.

This experiment failed to confirm the hypothesis regarding gross speed. However, when net speed, calculated on the basis of errors made on the timed writings is the consideration, the experimental group of both analysis attained results significant at the 1 per cent level of confidence.

The number of errors is significantly fewer in both analysis of those taught by the sight method. This method results in fewer errors at about the same gross speed as those taught the conventional way. The error mean increased for the experimental group to a peak the second quarter then remained constant. However, the control group errors increased steeply through the third quarter and flattened out; and the error mean remained much higher then the mean for the experimental group. Evidentially the sight method is effective in increasing accuracy in typewriting.

A strong relationship was found between the control variables and gross speed in typewriting but not between the control variables and errors or net words. This implies that the two groups matched on these variables had about the same potentiality for successful achievement in learning the typewriting skill. Since the errors or net words could not be predicted through control variables, it is safe to assume that the difference shown in the two groups was caused by the difference in the two teaching methods.

The multiple correlation between the gross words and the control variables in the samples indicates that piano background, reading ability, sex, intelligence quotient and grade average would be good potential in predicting achievement in gross typewriting speed.

The results of this research thus indicates that the sight method of teaching typewriting merits trial by teachers. Further research is recommended involving a larger sample in various locations and using a greater number of teachers.

THE SIGHT METHOD OF TEACHING TYPEWRITING TECHNIQUE AND KEYBOARD

Part I. INTRODUCTION

Purpose: The primary objective of this research was to test this hypothesis: That students who watch their fingers in the beginning weeks of typewriting instruction will develop better technique as shown on tests of speed and accuracy at the end of the school year than students who watch only their copy and refrain from looking at their fingers according to the conventional teaching method.

A secondary objective was to determine if sex, reading ability, intelligence quotient, piano, and grade average contribute or relate to the number of gross words, errors, and net words that pupils are able to type after one year of instruction.

Problem-Justification: In recent years, typewriting specialists have suggested that the sight method of teaching beginning typists has merit. For example, Dr. Leonard J. West of the City University of New York, wrote an article in the Business Education World, September, 1967, in which he says, . . . "nonvisual typing at the outset amounts to the futile expectation that learning can take place without reinforcement. The kinesthesis findings should make it apparent that the conventional insistence on nonvisual operation at the start of learning is seriously wrong and that decidedly longer tolerance of sight typing is required than even the boldest of today's teachers imagine or permit. Surely a study that points to an about-face on the central feature of instruction should be considered useful. The many instructional details on how to handle sight typing in the classroom remain to be worked out; at the outset, perhaps in trial-and-error fashion by teacher."[1]

The instigator of this research, who has been using the visual method of teaching the keyboard for ten years, feels that this study should help reduce the "trial-and-error" difficulties. The purpose of the research described in this paper is to prove whether or not this visual method of teaching beginning typists is effective and to what degree.

The research hereby proposed would have the beginning typist watch his fingers until the keyboard has been learned and the correct techniques have been developed. The time required for the learning period will, of course, vary with the individual but should be, on the average, about the first fifteen hours of instructional time.

Further justification of the theoretic principles underlying this research is the fact that typewriting is classified as a psychomotor

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[1]Leonard J. West, "Teachers' Perceptions of Research," Business Education World, (Sept. 1967), p.34.

skill; therefore, typewriting teachers should benefit from the theories of muscular learning used by coaches and instructors in the other fields that involve muscular learning.

Specialists teaching in these areas advocate the use of visual analysis to evaluate and improve performance. Coach Lyle Brown of the University of Rochester said, "It is often a revelation to an individual player to watch his own performance through the camera's eye."[1] Coaches have made it possible for an athlete to watch his own performance to encourage higher levels of achievements. The athlete performs while the coach takes snapshots or movies. Analysis of the picture is followed by more practice and more pictures until the technique is as nearly perfect as possible. Dancing instructors, as well as coaches, have found that the body movements are not always what the performer thinks they are, For example the beginner in dancing watches his feet to see what they are doing and where they are going. While watching his feet perform correctly, the dancer develops the "feel" of the action, gaining confidence through seeing and feeling, until he can perform without watching his feet; however, to prevent any lapse, mirrors are placed around the room so that the dancer can see his posture and movements.

As in the fields of physical education so in the field of typewriting, muscular learning needs visual aid because the feel alone may be deceptive. Dr. Edward E. Wanous of South-Western Publishing Company and other educators have advocated having television screens by the student's desk to enable the typist to watch his fingers for the purpose of improving his strokes.[2] This method is prohibitively expensive.

Educators have long recognized the fact that the employment of the maximum number of senses produces the most efficacious learning experience. For example, many teachers have achieved good results by using the sense of hearing in connection with the kinesthetic sense by calling out the keys as the students strike them. The kinesthetic sense tells one how it feels when he selects the right amount of muscular force and applies it at the right time in the proper direction.

Neuro-muscular integration is important to a typist and can be improved only with correct practice. Dr. Lee Cronbach states, "If a person practices before he knows the correct general pattern of the task, he is likely to practice wrong action."[3] To unlearn an incorrect technique and relearn correct responses is difficult; therefore, when this becomes necessary, most students become discouraged to the "dropping out" point. The hours spent on technique, watching the fingers and developing correct feel, are not only essential for the muscular learning but are important in developing a good mental attitude toward typewriting.

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[1]Lyle Brown, "Greater Coaches"; Athletic Journal: Sept. 1966; p. 48.

[2]Edward E. Wanous, lecture given in Fairfax County to Teachers' in-service meeting - Spring 1967.

[3]Lee J. Cronbach; Educational Psychology, (New York and Burlingame: Harcourt, Brace & World, Inc., 1963), p. 284.

The sense of sight will also help the student remember where the key is located. A study made by Guy H. Weaver in 1938 proved the sight method as a learning device to be effective in learning the keyboard. His study did not emphasize the watching of fingers to develop correct technique but to learn where keys are located. Weaver concluded, "There is no evidence to the contrary that the teaching of key locations by the sight method was in any way an interference to the pupils learning to type by the touch method. Key locations may be learned in less time with advantageous transition from the letter keyboard through sight to the touch method of operation."[1]

As far as can be determined, no research has been done on teaching typing by watching the fingers to gain correct technique and to avoid wasted motion. As has been shown, often in the beginning of a new muscular activity the body does not perform as the subject thinks it is performing. Because of this tendency, the beginning typist should watch the fingers to see that they are moving in the correct patterns. Through employing to the fullest the sense of sight for the purpose of learning, criticizing and evaluating his own skills and technique, the student will develop a correct pattern that becomes inherent in his continued growth and performance.

Part II. PROCEDURES USED IN THE STUDY

The major experimental samples consisted of two beginning typewriting classes of 56 sophomore students in each group. The students in the groups were matched individually according to four variables. The individual matching was done to help control extraneous variables.

After the second quarter, the remaining students who could not be individually matched were used to form a second experimental and control group of 51 students in an attempt to further validate the results from the first analysis.

Description of Traditional Method of Typewriting (Control Group)

The control group was taught in the traditional manner as outlined by the authors of South-Western Publishing Company text:

> Economy in learning time will result from the use of a uniform pattern for teaching the new reach-strokes. Direct the students to look at the textbook illustration and note the visual cues that identify the controlling finger; then have them look at the keyboard of the typewriter and locate the key to be controlled and get an "eye picture" of the direction and the distance of the reach of the new key. Have them watch the finger make a few experimental reach-strokes. Sight effectively guides the finger in making the initial reach. This watching the finger

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[1]Guy H. Weaver, "The Effectiveness in Teaching Keyboard Locations on the Typewriter by the Sight Method." Master Thesis, University of Iowa, 1938.

is limited to the initial practice and discouraged in the continuity typewriting. It is not permanent and will not persist under the spur of pressure for increased stroking.[1]

Description of Experimental Method of Teaching Typewriting (Experimental Group)

The primary difference between the sight method and the conventional method of teaching typewriting is that students do not use printed copy for the first twelve to fiteen hours of typewriting. Emphasis is placed on how the fingers move rather than on the material typed. The teacher describes and demonstrates correct stroking of the key and explains that all fingers not used in the stroking of the key remain over home keys. The students watch their fingers to see that they remain in correct position and that correct technique is used in stroking the key. The teacher checks each student before another stroke is practiced and, if necessary, demonstrates individually correct technique.

As the students stroke the key, they are encouraged to say the letter being typed to themselves to help develop neuro-muscular integration in mastering the key position. Therefore, students learn the keys while developing good technique.

Keys are presented in the same order as in the 20th Century Typewriting text published by South-Western Publishing Company.

After the students have practiced and reviewed all letter keys, the shift key, and space bar, the instructor calls out letters and words while he and the students watch finger movements.

From twelve to fifteen hours are spent watching fingers and using no copy. The teacher will judge when the class is ready to be transferred to copy watching. In this research, twelve hours were spent in watching finger technique.

When the students transfer to watching the copy, the teacher continues for about six weeks to observe the students so faulty technique can be corrected. The students appear to have no difficulty in making the transfer from finger watching to copy watching. They seem to have confidence and, therefore, feel less need for looking at the key board as they are often observed doing in the conventional classes.

When students begin to watch the copy, they start with the first lesson in the text and they cover from one to three lessons a day until they have typed the text introduction to the keyboard.

The number row is taught when presented in the text by the same method as was used for letter keys.

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[1] D. D. Lessenberry, T. James Crawford, and Lawrence W. Erickson, 20th Century Typewriting Teachers Manual (New Rochelle, New York: South-Western Publishing Co., 1965), p. 16.

Design of Research

For this research fifty-six sophomores from Hayfield High-Intermediate School composed the experimental group and fifty-six sophomores from Edison High School made up the control group. Both schools are in Fairfax County, Virginia, and serve the same general area.

The students used in the two groups were matched and individually paired according to the following variables:

1. Age - All students were in a twelve-month age bracket and in the tenth grade as this could reflect motivation and/or coordination.

2. Sex - Students were matched according to sex as the female student may be better coordinated and more highly motivated than the male student.

3. Grade average - Pairs were matched with the same grade average as this could reflect motivation to all learning.

4. Intelligence - The California Mental Maturity Test was used and pairs of the students were matched within five points.

Table I shows that two groups were well matched and that there was no significant difference on these pre-treatment variables. Fifty-one students in each school who could not be individually matched were group matched. Table II in the appendix shows that these additional fifty-one students were matched with no significant difference on the above-mentioned variables. They were tested during the last two quarters to see whether they reinforced the findings on the test of the individually matched groups.

Teachers used for the groups were well qualified. The control group teachers were Mrs. Ford, B. A. Degree and four years' teaching experience; Mrs. Hall, B. A. Degree and six years' teaching experience, and Mrs. Norton, M. A. Degree and nineteen years" teaching experience.

The originator of this research taught two experimental classes and had a B. S. Degree and twenty years' teaching experience. Miss Hillian, B. S. Degree with three years' teaching experience, taught a class using the sight method by playing audio tapes made in the other experimental classes.

In an effort to avoid the Hawthorne effect, students were not told they were participating in a research project.

The Edison teachers had always used the teaching procedures as recommended by the 20th Century Typewriting Manual published by South-Western Publishing Company, and they agreed to continue this procedure during this school year.

After twelve hours of using the sight method of teaching, the experimental class started using the textbook and watching the copy. After thirty more hours, the experimental group was on the same lesson in

the text as the control group. Subsequently both groups of classes were taught in the same way for the remainder of the school year with one exception. Namely, each nine weeks for one hour the experimental group had a typing technique review lesson.

Manual typewriters were used in both classes and the only teacher's aid in the way of audio-visual equipment was rhythm records. All classes used these records for about an equal amount of time.

Students were asked whether or not they played piano and this was recorded to see if this related learning affected the typing skill. They were not matched according to this criterion.

Timed writing tests were used for comparing the two groups. Each student's paper was checked by his own teacher and by a teacher of the other research group. At least two teachers were present when tests were being administered. Each student took two timed writings and the better of the two was checked for the research.

Three-minute timed writings on new material were given to both groups on November 7-8, 1968. Gross words, errors and net words per minute were recorded for both groups. New words were computed by taking three words from the gross words for each error.

A five-minute timed writing test was administered January 30-31, April 1-2, and May 26-27, 1969. Gross words, errors and net words per minute were recorded and two words were subtracted from the gross words for each error made.

Methods of Analysis

The results in the matched control and experimental samples were analyzed by analysis of variance taking into account the effect of matching.[1] The cross-validation samples of unmatched groups were compared by ordinary "t" tests.

Part III. ANALYSIS AND INTERPRETATION OF RESULTS

A. First Analysis

As previously explained, the central problem of this research project was to determine if pupils who had been taught typing by the sight method obtained higher typing scores, that is, more words per minute and with fewer errors than students who had been taught typing by more conventional methods. The experimental group was considered to be those students who had learned typing by the sight method and the control group was those students who had learned through the conventional method. In the first analysis, one group of 56 students

[1] McNemar, Q. Psychological Statistics, (New York: Urley & Sons, 1962), p. 101.

were individually matched with another group of 56 students. Students on the variables of sex, grade point average, reading ability, and intelligence quotient scores.

As expected, the comparison reported in Table 1 indicates that there were no significant differences between the matched groups in grade average, reading ability, or intelligence quotient. This simply indicates that the students were well matched on these variables.

As may be seen in Table 1, at the end of the first quarter the control group was able to type slightly more gross words than was the experimental group, but they also made a few more errors. The result was that the net words they were able to type was approximately the same.

By the end of the second quarter, there was no significant difference in the number of gross words which the two groups were able to type. However, the experimental group made considerably fewer errors per minute than did the control group (0.01 level of confidence), and because of this the net words typed was slightly in favor of the experimental group.

At the end of the third quarter, the same trend seen during the second was evidenced, except that the net words typed was even more in favor of the experimental group (0.01 level of confidence). By the end of the (4th quarter), there was still no difference in the number of gross words typed.

The greatest difference between the typing skills of the two groups during the last half of the year was in the number of errors made in typing a timed writing which of course, effected the net speed. Figure 2 compares errors made on timed tests through out the year. By the end of the year the experimental group had significantly fewer errors than the control group. Of the 56 students in each group, 43 (76.7%) of the experimental group typed with fewer than 6 errors at the end of the year, while 17 (30.3%) of the control group had reached this goal.

Figure 1 shows the comparison of the two groups in net words typed at the end of the second and fourth quarters. This illustration clearly shows that the frequency distribution was not normal for the control group for either the second or fourth quarter. The experimental group showed a bell shaped curve which became more pronounced in the last quarter of testing. At the end of the second quarter there were 34 students in the control group and 33 in the experimental with fewer than 21 words per minute. At the end of the year, 27 of the control group had not progressed above this speed while only 8 in the experimental group were in this lower speed range. This would seem to indicate that in the experimental group, good techniques developed through "finger watching" would permit continued speed development and that the control group taught by the conventional method, would have far greater difficulty in increasing net speed beyond their earlier level.

In summary, and as shown in the comparison of means in Figure 3, students who were taught by the sight method appeared to gain in the number of gross words typed at about the same rate as those students who were taught by conventional methods. The students taught by the sight method tended to make fewer errors as they progressed through the academic year, while students taught by conventional methods gained in the number of errors per minute. The result was that students taught by the sight method were able to type significantly more net words per minute.

B. Second Analysis

In order to further validate the above reported findings, 51 pupils who had studied by the sight method and 51 pupils who had studied by conventional methods were also compared and not individually matched. These students were compared for differences in sex, whether or not they had had piano, grade point averages, reading ability, and intelligence quotients. As indicated in Table 1 there were no significant differences between the groups in their means on the control variables. This second selection of students (Figure 4) showed the same pattern of change in the number of gross words typed, the number of errors, and the number of net words typed. The number of gross words typed was about the same at the end of both the third and fourth quarters, but the control group made more errors at the end of both quarters and as a result scored fewer net words per minute. Again, the level of confidence was beyond the .01 level.

Predictability of Typing Scores

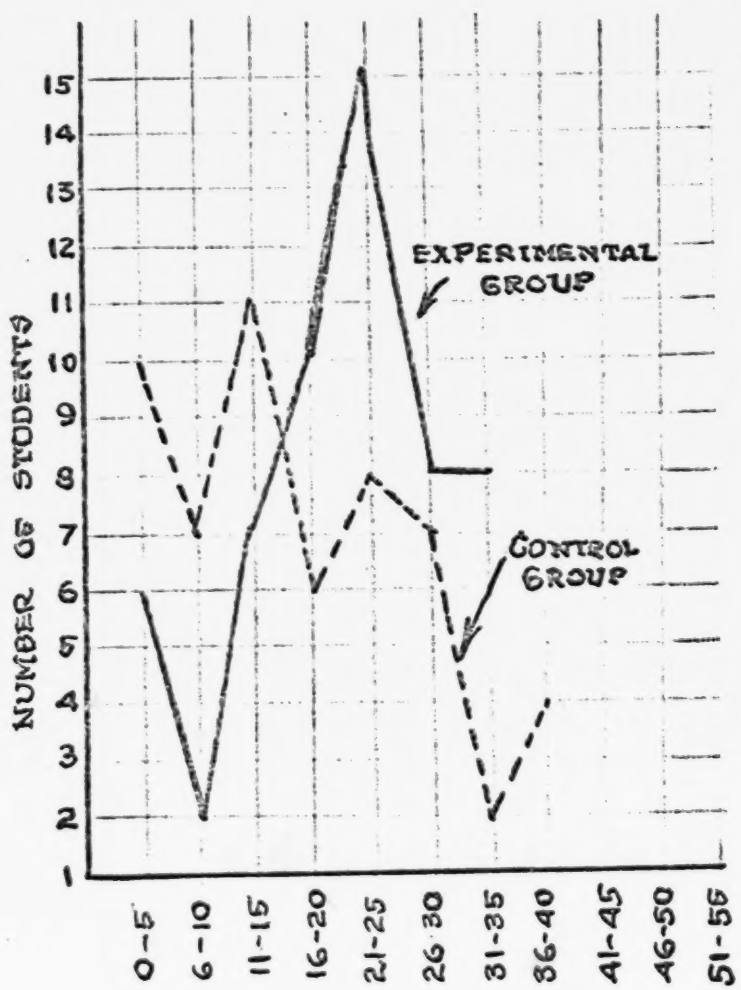
The purpose of this section is to examine the relationship between the control variables, i.e., sex, piano ..., and gross words, errors, and net words typed per minute by the students and to test the degree to which gross words, errors, and net words may be predicted from the just mentioned control variables.

The Table 6 presents the correlation matrix for the different variables used in the report. The variable "sex" was fairly well correlated with gross words per minute (r=0.315), and net words (r=0.314), but not too well with the number of errors per minute (r=0.124). The correlation indicates that the girls were able to type more gross words and net words. The students' grade point averages were correlated with gross words (r=0.318), but not with the number of errors or net words. Reading ability was correlated with gross words and net words, but not with the number of errors per minute. The students' intelligence quotients were correlated at 0.269 with gross words, but intelligence quotients were uncorrelated with either errors or net words. Students who had studied piano tended to type more gross words per minute (r=0.354) and slightly more net words (r=0.208), but tended to make about the same number of errors per minute.

The number of gross words was not correlated with the number of errors per minute (r=0.009) which indicated that students who tended to type fast make no more mistakes than students who type more slowly.

FIGURE 1

COMPARISON OF NET WORDS PER MINUTE OF MATCHED GROUPS (N 112)



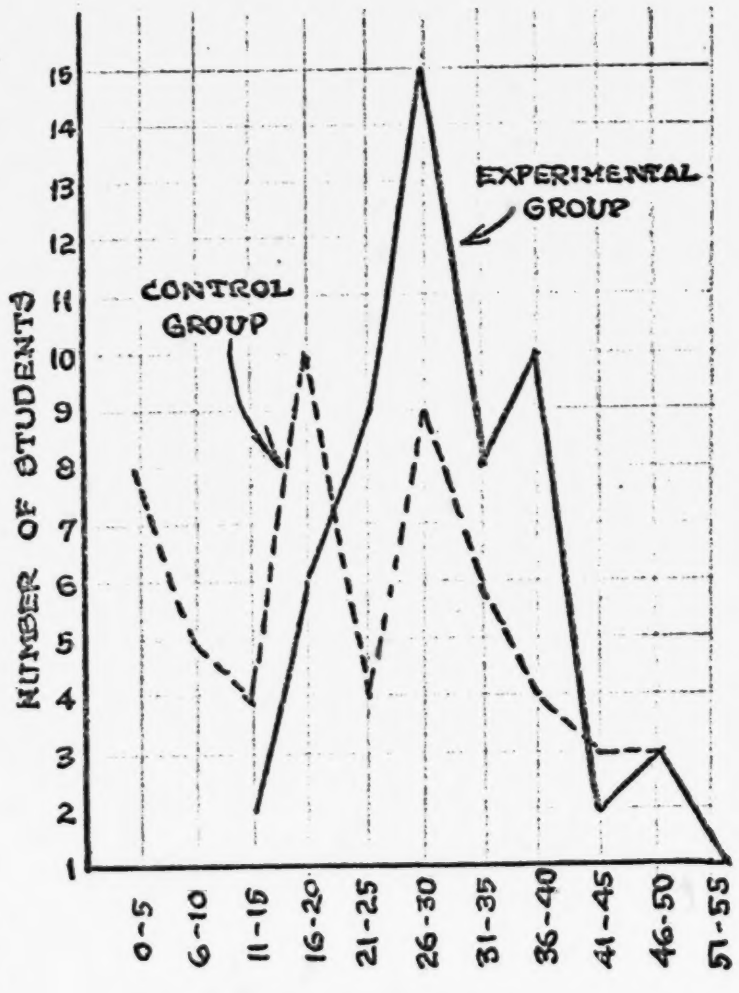
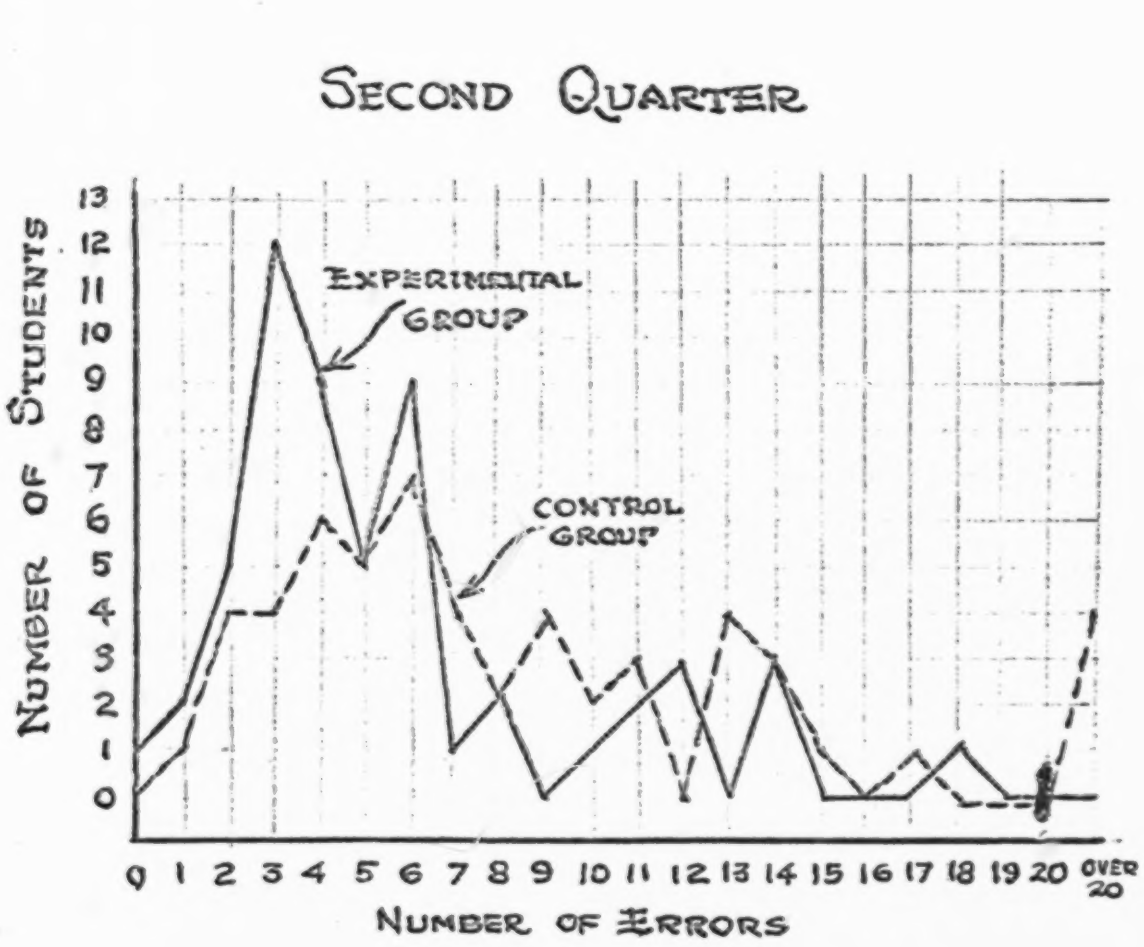
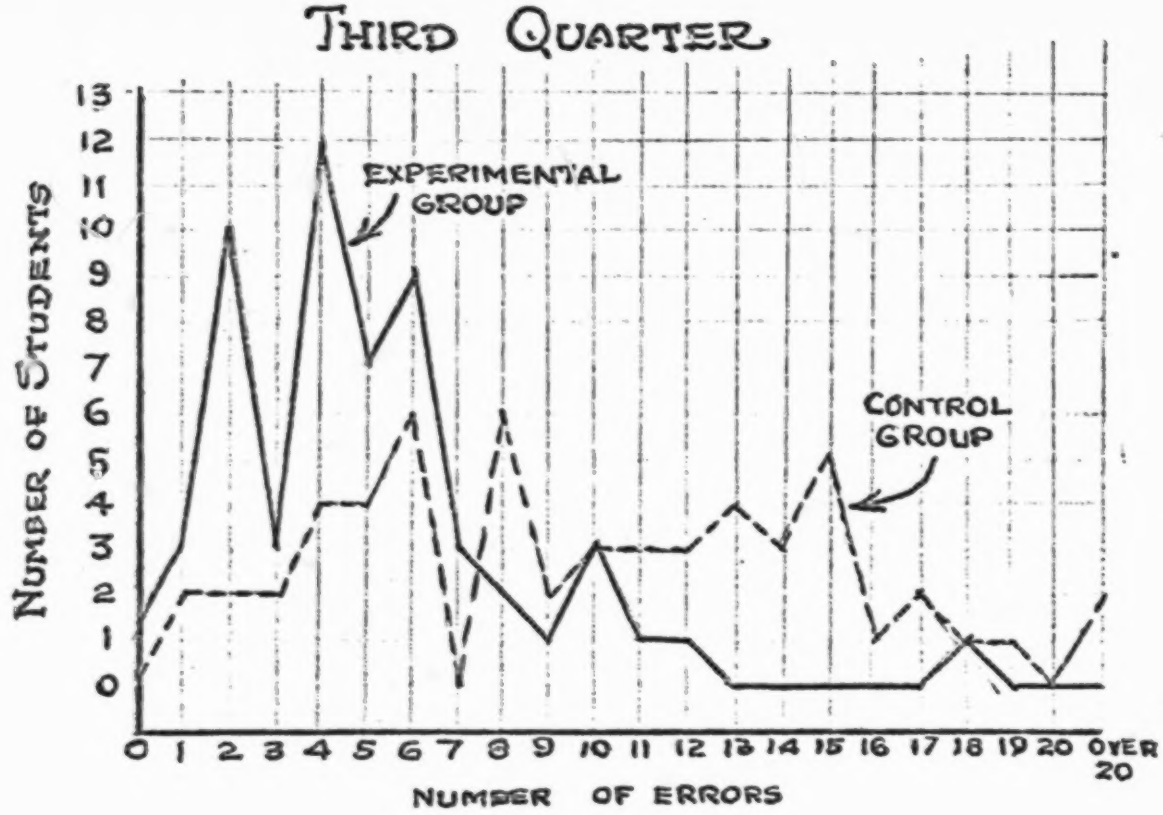


FIGURE 2

COMPARISON OF TYPEWRITING ERRORS OF EXPERIMENTAL AND CONTROL GROUPS BY QUARTERS – MATCHED GROUP


SECOND QUARTER
NUMBER OF STUDENTS
0 1 2 3 4 5 6 7 8 9 10 11 12 13
EXPERIMENTAL GROUP
CONTROL GROUP
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 OVER 20
NUMBER OF ERRORS


THIRD QUARTER
NUMBER OF STUDENTS
0 1 2 3 4 5 6 7 8 9 10 11 12 13
EXPERIMENTAL GROUP
CONTROL GROUP
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 OVER 20
NUMBER OF ERRORS

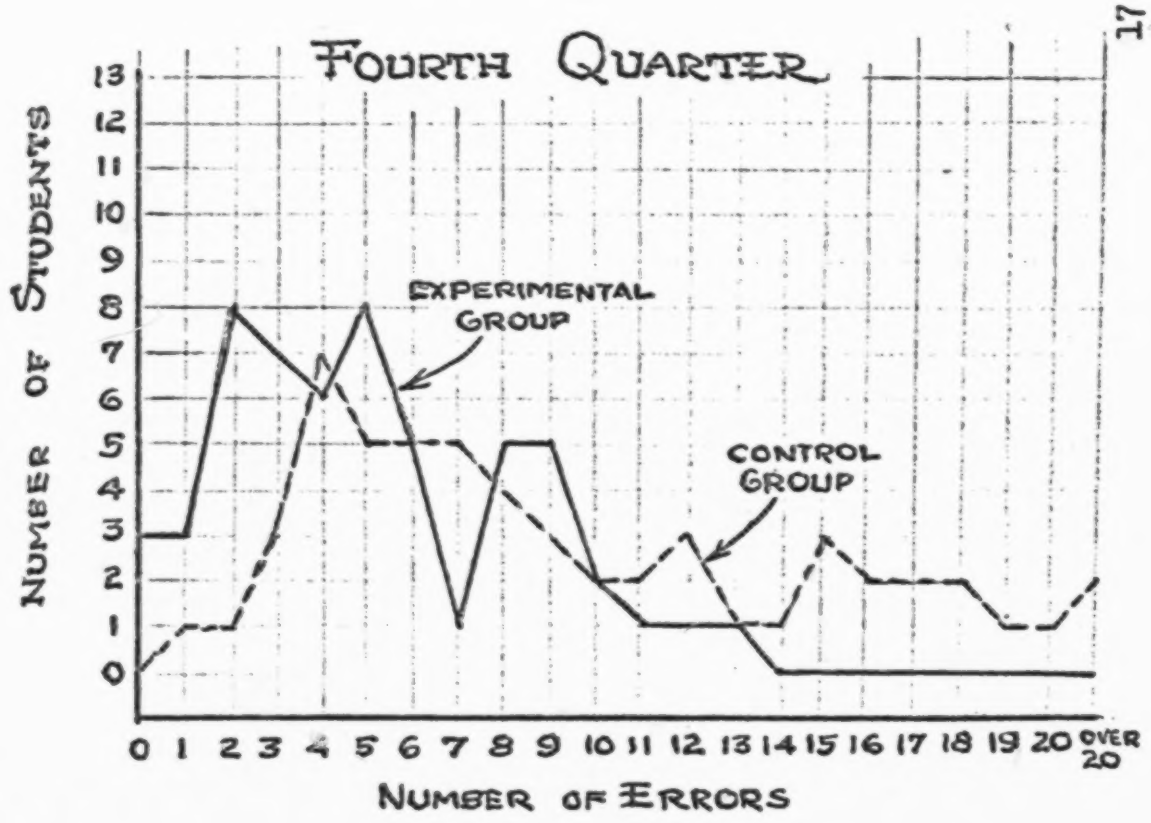

17
FOURTH QUARTER
NUMBER OF STUDENTS
0 1 2 3 4 5 6 7 8 9 10 11 12 13
EXPERIMENTAL GROUP
CONTROL GROUP
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 OVER 20
NUMBER OF ERRORS

FIGURE 3

CHANGE PER QUARTER OF GROSS WORDS, ERROR AND NET WORDS MEANS OF MATCHED GROUPS (N-112)

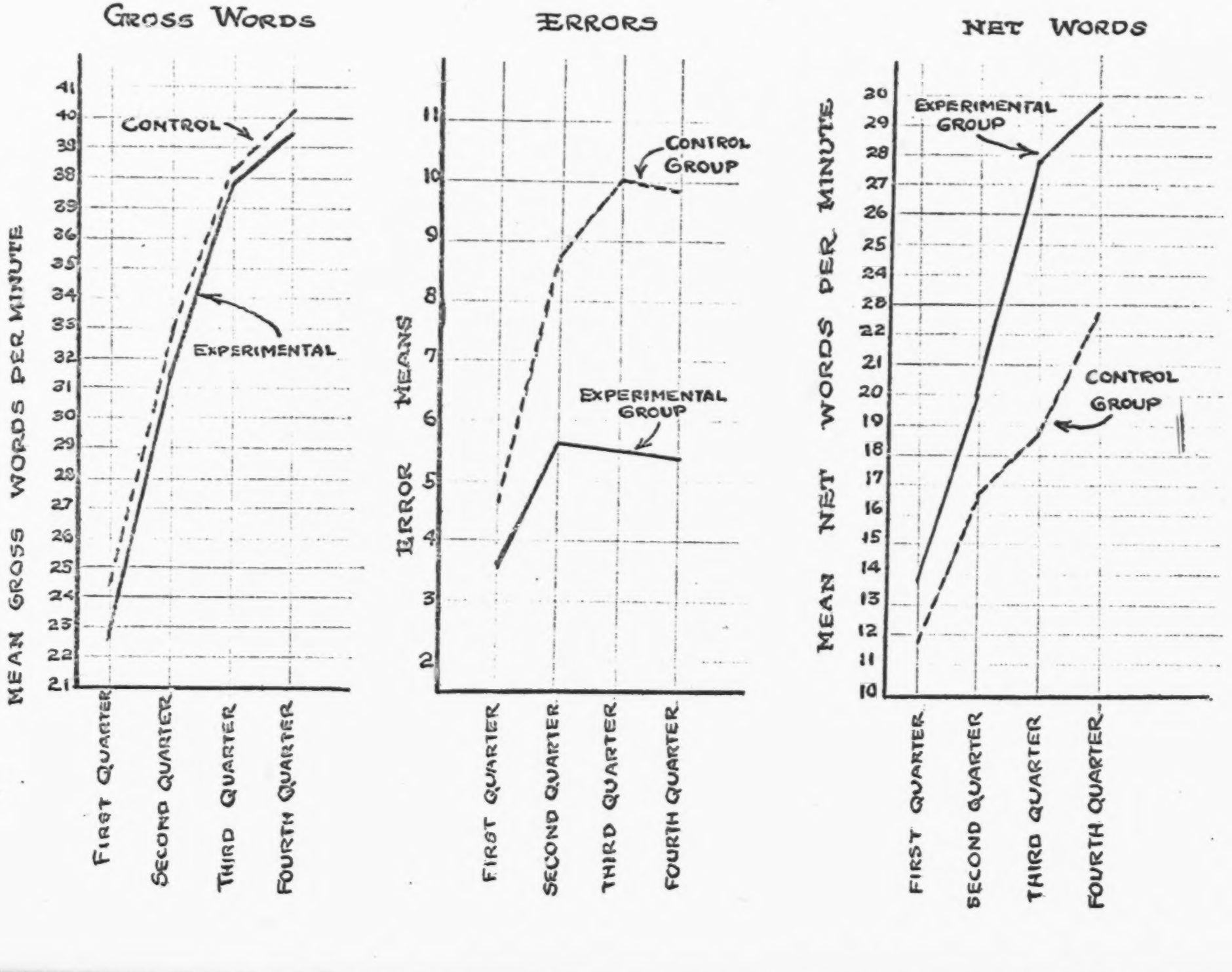
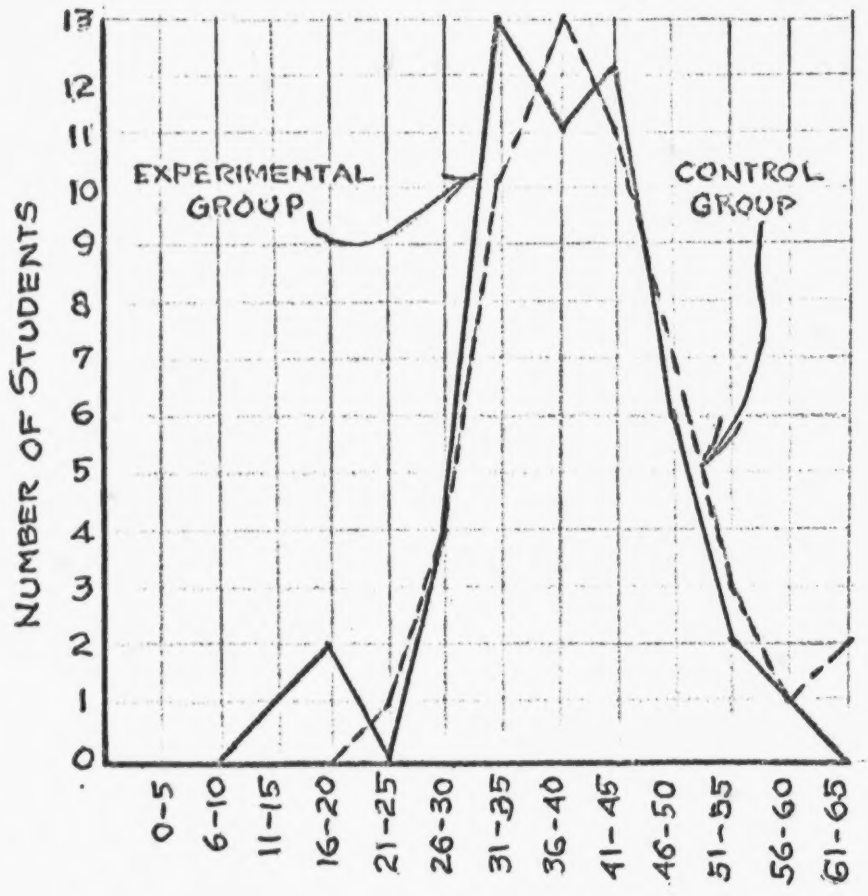


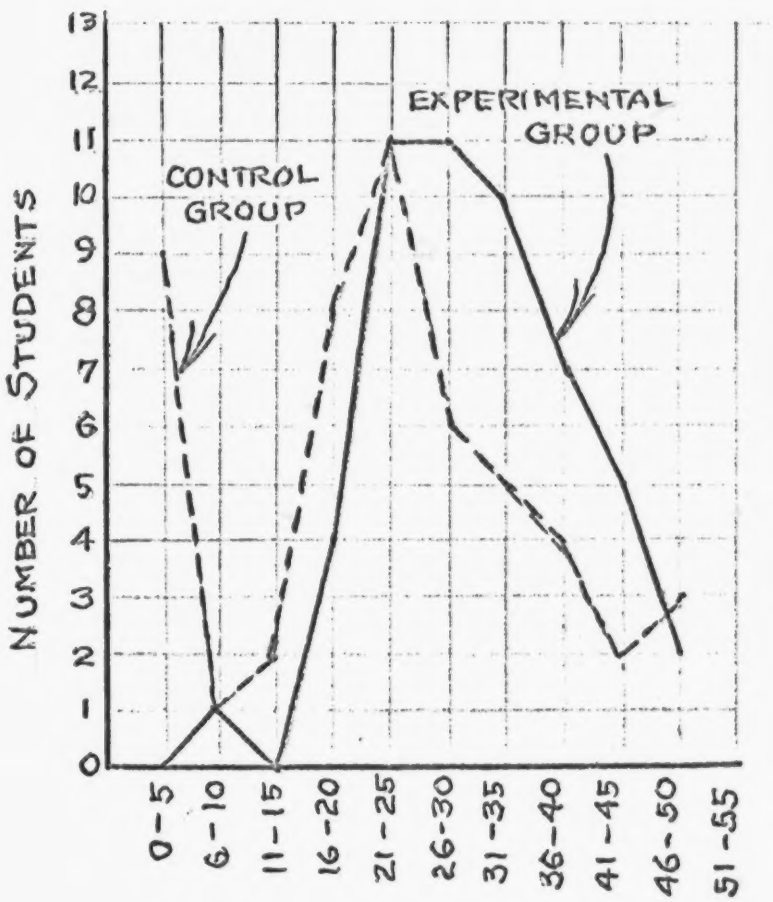
FIGURE 4

FOURTH QUARTER COMPARISON OF GROSS WORDS, ERROR AND NET WORDS OF UNMATCHED PAIRS (N-102)

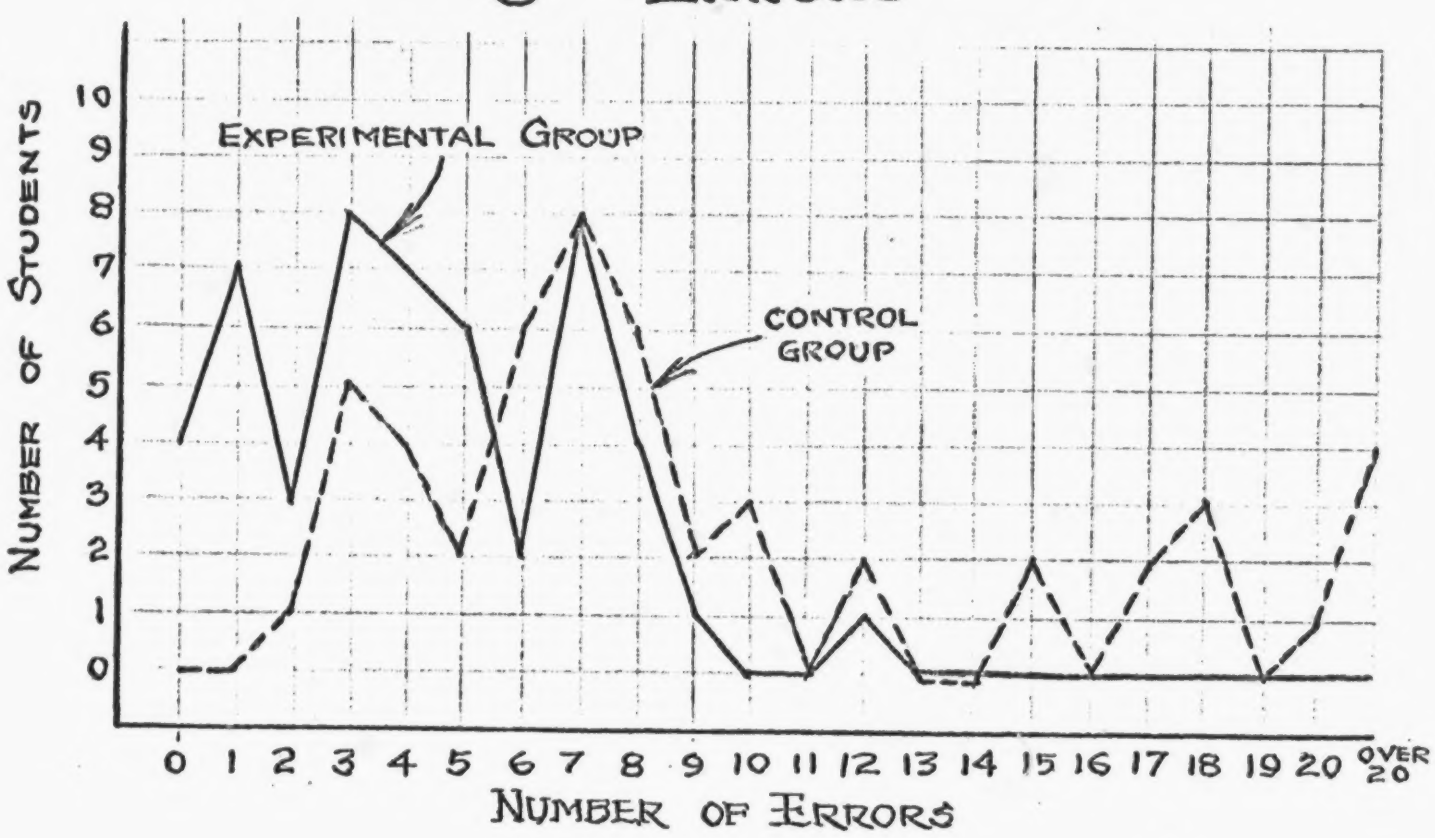
(1) GROSS WORDS



(3) NET WORDS



(2) ERRORS



(4)

Table 1

SIGNIFICANCE OF DIFFERENCE IN MEANS BETWEEN ONE GROUP OF PUPILS TAUGHT TYPING BY THE SIGHT METHOD (EXPERIMENTAL) MATCHED WITH A GROUP TAUGHT BY CONVENTIONAL METHODS (CONTROL)

Variable	Mean (X) (Experimental) (N=56)	Mean (Y) (Control) (N=56)	X - Y	t-value	Significance
Pre-test					
Grade average	2.27	2.27	0.02	1.01	n. s.
Reading ability	64.61	65.00	-0.39	0.45	n. s.
Intelligence quotient	107.00	107.61	-0.61	1.42	n. s.
Post-tests					
1st quarter					
Gross words	22.66	24.30	-1.65	1.77	0.05
Errors	3.55	4.79	-1.23	1.97	0.05
Net words	13.16	11.91	1.25	0.76	n. s.
2nd quarter					
Gross words	31.59	32.96	-1.37	0.71	n. s.
Errors	5.61	8.79	-3.18	3.29	0.01
Net words	20.29	16.66	3.63	1.90	0.05
3rd quarter					
Gross words	37.93	38.36	-0.43	0.36	n. s.
Errors	5.05	10.09	-5.04	5.43	0.01
Net words	27.88	18.89	8.98	4.19	0.01
4th quarter					
Gross words	39.55	40.21	-0.66	0.51	n. s.
Errors	5.04	9.95	-4.91	4.83	0.01
Net words	29.91	22.07	7.84	3.59	0.01

Table 2

SIGNIFICANCE OF DIFFERENCES IN MEANS BETWEEN TWO UNMATCHED GROUPS OF PUPILS TAUGHT TYPING BY THE SIGHT METHOD (EXPERIMENTAL) AND BY CONVENTIONAL METHODS (CONTROL)

Variable	Mean (X_1) (Experimental) N=51	Standard Deviation (S_1)	Mean (X_2) (Control) N=51	Standard Deviation (S_2)	$\bar{X}_1 - \bar{X}_2$	t-value	Significance
Pre-test							
Sex (1=F, 2=M)	1.39	0.49	1.47	0.50	0.08	0.08	n. s.
Piano (1=yes, 2=no)	1.90	0.30	1.80	0.40	0.10	1.42	n. s.
Grade average	2.35	0.90	2.47	0.82	0.12	0.68	n. s.
Reading ability	63.45	23.81	60.04	26.54	3.41	0.68	n. s.
Intelligence quot.	106.02	11.45	108.94	13.55	2.92	1.16	n. s.
Post-test							
3rd quarter							
Gross words	36.94	7.95	37.71	8.20	0.76	0.47	n. s.
Errors	5.67	4.08	9.53	5.42	3.86	4.03	0.01
Net words	25.76	10.78	19.82	13.67	5.94	2.41	0.01
4th quarter							
Gross words	38.39	7.89	40.61	8.43	2.22	1.36	n. s.
Errors	4.18	2.71	10.04	7.68	5.86	5.09	0.01
Net words	30.25	8.33	22.59	13.69	7.67	3.38	0.01

Table 3

LIST OF VARIABLES ENTERED INTO REGRESSION FORMULA TO PREDICT GROSS WORDS IN ORDER ENTERED AND CORRESPONDING REGRESSION COEFFICIENTS, PROPORTION OF VARIANCE EXPLAINED (R^2) AND MULTIPLE CORRELATION COEFFICIENTS (R)

Variable	Regression Coefficients	R^2	R
Piano (1=yes, 2=no)	-4.085	0.125	0.354
Reading ability	0.055	0.215	0.464
Sex (1=F, 2=M)	-5.795	0.283	0.532
Intelligence quotient	0.152	0.332	0.576
Grade average	13.664	0.340	0.583
(Intercept)	31.389		

Table 4

LIST OF VARIABLES ENTERED INTO REGRESSION FORMULA TO PREDICT ERRORS IN ORDER ENTERED AND CORRESPONDING REGRESSION COEFFICIENTS, PROPORTION OF VARIANCE EXPLAINED (R^2) AND MULTIPLE CORRELATION COEFFICIENTS (R)

Variable	Regression Coefficients	R^2	R
Sex (1=F, 2=M)	1.539	0.015	0.124
Grade average	10.417	0.021	0.146
Reading ability	-0.034	0.030	0.172
Intelligence quotient	0.035	0.032	0.178
Piano (1=yes, 2=no)	-0.058	0.032	0.179
(Intercept)	1.699		

Table 5

LIST OF VARIABLES ENTERED INTO REGRESSION FORMULA TO PREDICT NET WORDS IN ORDER ENTERED AND CORRESPONDING REGRESSION COEFFICIENTS, PROPORTION OF VARIANCE EXPLAINED (R^2) AND MULTIPLE CORRELATION COEFFICIENTS (R)

Variable	Regression Coefficients	R^2	R
Sex (1=F, 2=M)	-8.795	0.099	0.314
Reading ability	0.132	0.160	0.400
Piano	-3.047	0.173	0.416
Intelligence quotient	0.111	0.177	0.421
Grade average	-16.282	0.182	0.426
(Intercept)	25.747		

The inter-correlations indicated that the boys tended to have slightly higher intelligence quotients (r=0.278) and fewer of the boys reported taking piano (r=0.288).

As indicated in Table 3, the gross words which a student will be able to type may be predicted with 34 per cent accuracy (R^2=0.340) with the following predictor variables: piano, reading ability, sex, intelligence quotient, and grade average. These variables are listed in the order in which they tended to increase the predictability of the equation, that is, "piano" permitted the greatest predictability followed by "reading ability" in combination with piano, and then followed by "sex" in combination with the other four. In fact, this variable increased the proportion amount of variance explained by the equation from 33.2 per cent to 34.0 per cent, an increase of only .8 per cent. The number of gross words typed per minute was fairly well correlated with the five predictor variables (R=0.583). From Table 3, an appropriate formula for predicting gross words is as follows:

$$Y = 31.39 - 4.08 X_1, + 0.05 X_2 - 5.79 X_3 + 0.15 X_4 + 13.7 X_5$$

where

Y = predicted gross words
X_1 = piano (1=yes, 2=no)
X_2 = reading ability
X_3 = sex (1=female, 2=male)
X_4 = intelligence quotient
X_5 = grade point average

As suggested by the preceding correlation analysis, the number of errors made by each student could not be effectively predicted by the five predictor variables. The five variables in combination explained only 3.2 per cent of the variation in the number of errors per minute (R^2=0.32). There was little relationship between the number of errors, and sex, grade averages, reading ability, intelligence quotient, or whether or not the students had studied piano. The number of errors by each student was, therefore, dependent on the method of teaching or, perhaps, some concomitant variable.

The number of net words per minute could not be predicted with the efficiency with which the gross words per minute were predicted. As indicated in Table 5, only 18.2 per cent of the variation in net words was predicted by the five independent variables (R^2=0.182).

In summary, a strong relationship was found between the control variables and gross words, but not between the control variables and errors or net words.

Part IV. CONCLUSIONS AND RECOMMENDATIONS

The hypothesis stated that students using the sight method in the beginning weeks of typewriting instruction would have greater speed and accuracy at the end of the first school year than students who had been taught by the more conventional method.

This experiment failed to confirm the hypothesis regarding gross speed. However, when net speed, calculated on the basis of errors made on the timed writings is the consideration, the experimental group of both analysis attained results significant at the 1 per cent level of confidence.

The number of errors is significantly fewer in both analysis of those taught by the sight method. This method results in fewer errors at about the same gross speed as those taught the conventional way. The error mean increased for the experimental group to a peak the second quarter then remained constant. However, the control group errors increased steeply through the third quarter and flattened out; and the error mean remained much higher then the mean for the experimental group. Evidentially the sight method is effective in increasing accuracy in typewriting.

A strong relationship was found between the control variables and gross speed in typewriting but not between the control variables and errors or net words. This implies that the two groups matched on these variables had about the same potentiality for successful achievement in learning the typewriting skill. Since the errors or net words could not be predicted through control variables, it is safe to assume that the difference shown in the two groups was caused by the difference in the two teaching methods.

The multiple correlation between the gross words and the control variables in the samples indicates that piano background, reading ability, sex, intelligence quotient and grade average would be good potential in predicting achievement in gross typewriting speed.

The results of this research thus indicates that the sight method of teaching typewriting merits trial by teachers. Further research is recommended involving a larger sample in various locations and using a greater number of teachers.

Table 6

SIMPLE CORRELATION COEFFICIENTS FOR VARIABLES USED TO DESCRIBE FIRST YEAR TYPING STUDENTS (N=112)*

Variable	Sex	GPA	Rd. Ab.	I.Q.	Piano	Gr. Wd.	Er.	Net.Wds.
Sex (1=F, 2=M)	1.000	0.098	0.116	0.278	0.288	-0.315	0.124	-0.314
Grade average	0.098	1.000	0.579	0.550	-0.064	0.318	0.089	0.085
Reading ability	0.116	0.579	1.000	0.487	0.010	0.296	-0.015	0.208
Intelligence quot.	0.278	0.550	0.487	1.000	0.011	0.269	0.097	0.083
Piano (1=yes, 2=no)	0.289	-0.064	0.010	0.011	1.000	-0.354	0.020	-0.208
Gross words	-0.315	0.318	0.296	0.269	-0.354	1.000	-0.009	0.623
Errors	0.124	0.089	-0.015	0.097	0.020	-0.009	1.000	-0.712
Net words	-0.314	0.085	0.208	0.083	-0.208	0.623	-0.712	1.000

*An r of 0.25 is significantly different from zero at 0.01 level, an r of 0.19 is significantly different from zero at 0.05 level

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